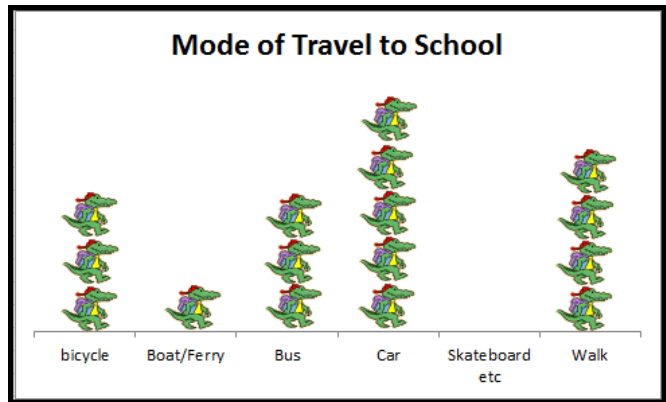


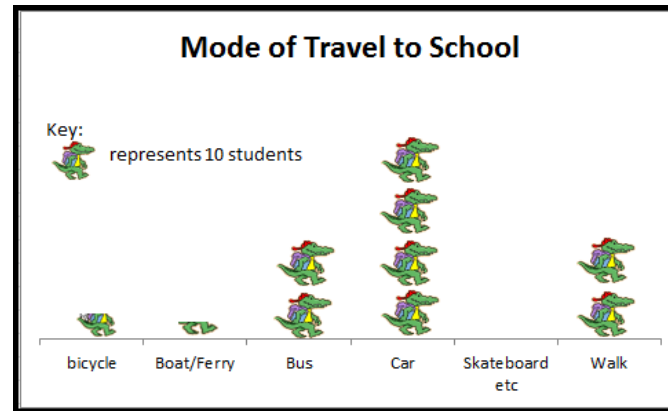
~ Excel 2010 Skills for Graphs and Displays ~

Tables frequency /tally table	Year level in Australi an curriculu m	Example of Chart	Excel Skills Note all instructions assume as sample size of 100 with a heading row in a1																											
Frequency table For categorical or discrete numerical data	2, 3, 4, 5, 6	Type of Travel to School <table><tr><td></td><td>tally</td><td>frequency</td></tr><tr><td>car</td><td> </td><td>48</td></tr><tr><td>walk</td><td> </td><td>21</td></tr><tr><td>bus</td><td> </td><td>20</td></tr><tr><td>boat/ferry</td><td> </td><td>1</td></tr><tr><td>bicycle</td><td> </td><td>4</td></tr><tr><td>skateboard etc</td><td> </td><td>2</td></tr><tr><td>TOTAL</td><td></td><td>96</td></tr></table>		tally	frequency	car		48	walk		21	bus		20	boat/ferry		1	bicycle		4	skateboard etc		2	TOTAL		96	FREQUENCY TABLE 1 1. Select method of travel to school, copy and paste into a new worksheet starting at a1. 2. Starting in a blank cell type the names of the different transport types down the page. 3. In the frequency column in the cell next to car type the formula =countif(a2:a101,"car") 4. Continue for each other variable, using the same range. Make sure the variable is in quotation marks and note that it is case sensitive. 5. Tally marks are formed with a 1 and strike through from the font menu in the Home tab. 6. Finish with a border by first selecting the table cells. In the Home tab go to Paragraph, select  then Borders and Shading to format your table.			
	tally	frequency																												
car		48																												
walk		21																												
bus		20																												
boat/ferry		1																												
bicycle		4																												
skateboard etc		2																												
TOTAL		96																												
Grouped frequency table For numerical data	(not specified)	Height of Students <table><tr><td>Height (cm)</td><td>tally</td><td>frequency</td></tr><tr><td>190 > 200</td><td></td><td>0</td></tr><tr><td>180 > 190</td><td> </td><td>2</td></tr><tr><td>170 > 180</td><td> </td><td>4</td></tr><tr><td>160 > 170</td><td> </td><td>15</td></tr><tr><td>150 > 160</td><td> </td><td>33</td></tr><tr><td>140 > 150</td><td> </td><td>32</td></tr><tr><td>130 > 140</td><td> </td><td>10</td></tr><tr><td>TOTAL</td><td></td><td>96</td></tr></table>	Height (cm)	tally	frequency	190 > 200		0	180 > 190		2	170 > 180		4	160 > 170		15	150 > 160		33	140 > 150		32	130 > 140		10	TOTAL		96	
Height (cm)	tally	frequency																												
190 > 200		0																												
180 > 190		2																												
170 > 180		4																												
160 > 170		15																												
150 > 160		33																												
140 > 150		32																												
130 > 140		10																												
TOTAL		96																												

			GROUPED FREQUENCY TABLE 2 1. Follow steps 1 & 2 above to set up a table after choosing an appropriate interval (eg 10 cm) 2. Order your data by first selecting it. In the Data tab under Sort and Filter and select Sort. 3. You now need to count the frequency of the data in each of your intervals and add this to the frequency table. 4. Follow steps 5. and 6. Above to finish.														
Picture graphs pictographs	Year level	Example of Chart	Excel Skills														
One to one correspondence Mainly used for categorical data	2, 3	Mode of Travel to School <table><thead><tr><th>Mode of Travel</th><th>Frequency (Crocodiles)</th></tr></thead><tbody><tr><td>bicycle</td><td>3</td></tr><tr><td>Boat/Ferry</td><td>1</td></tr><tr><td>Bus</td><td>3</td></tr><tr><td>Car</td><td>5</td></tr><tr><td>Skateboard etc</td><td>0</td></tr><tr><td>Walk</td><td>3</td></tr></tbody></table>	Mode of Travel	Frequency (Crocodiles)	bicycle	3	Boat/Ferry	1	Bus	3	Car	5	Skateboard etc	0	Walk	3	PICTURE GRAPH 1 1. Using Table 1, select type of travel and Frequency. Hint, use the Ctrl key to select non adjacent columns. 2. From the Insert tab select Column and then the first column graph. 3. Double click on any column to select it. 4. Right click and select 'Format Data Point'. 5. Select 'Fill' then 'Picture or texture Fill'... 6. From the Insert tab, choose Clip Art and select your picture by double clicking it.
Mode of Travel	Frequency (Crocodiles)																
bicycle	3																
Boat/Ferry	1																
Bus	3																
Car	5																
Skateboard etc	0																
Walk	3																

Many to one correspondence

Mainly used for categorical data

4, 6

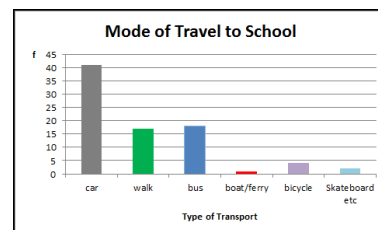
7. Change the scale by double clicking then right clicking. Choose 'Format data Point' then Fill and choose Stack and Scale with 1
8. Repeat for the other columns

PICTURE GRAPH 2

Follow steps 1 – 7 but choose 'Stack and Scale with....' 5 or appropriate number of units.

Bar Graphs
vertical/column or horizontal bar**Year level****Example of Chart****Excel Skills**

Bar chart
Used for categorical and discrete numerical data

3, 4, 5**BAR GRAPH 1**

1. Follow steps 1 – 3 in Picture Graph 1 above.
2. In the Layout tab choose Chart title and then Axis title to label your graph.
3. Change the colour of the bars by clicking on the bars to select all, and then clicking on one bar. Go to Format

Horizontal bar chart Useful when the category

names are long

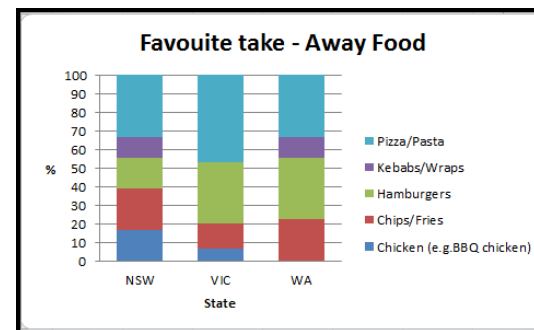
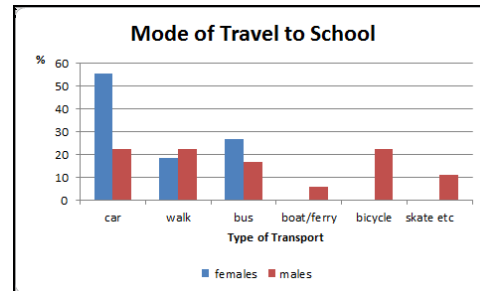
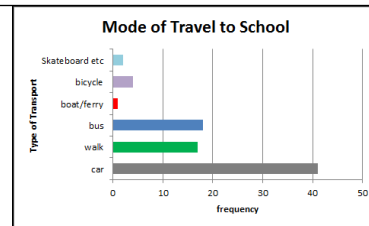
Side by side column Graphs 2 or more attributes for each variable

Stacked bar chart

For 2 or more attributes compared among 2 or more categories

6

(not specified)



and choose Shape Fill.

HORIZONTAL BAR GRAPH 2

1. As above but choose bar and not column graph in the Insert tab.

SIDE BY SIDE COLUMN GRAPH 3

1. Make sure you have a frequency table set up with 2 attributes e.g. male and female.
2. Follow steps 1 – 3 above. Note choosing the first bar chart type will give a side by side bar chart if the information is correctly set out in the frequency table.

STACKED BAR CHART 4

1. Make sure you have a frequency table set up with at least 2 attributes expressed as percentages.
2. Follow steps above and choose the second (for percentage frequency) or third (to convert to a % frequency) bar chart type from the Chart menu.

Dot Plots

Year level

Example of Chart

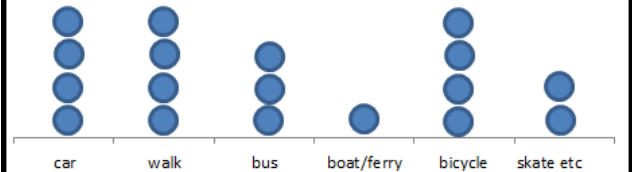
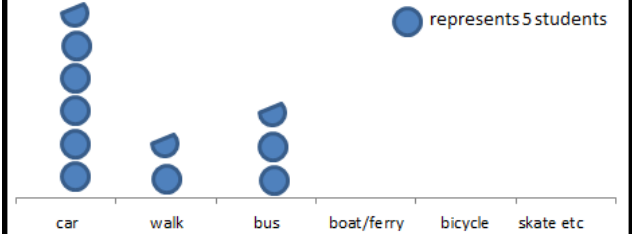
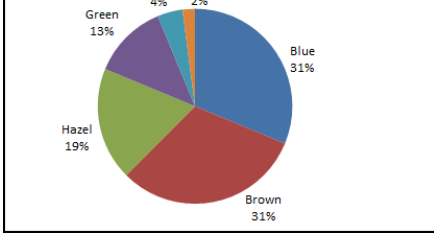
Excel Skills

One to one correspondence
Used for categorical and

5, 7
10
Compare

DOT PLOT 1

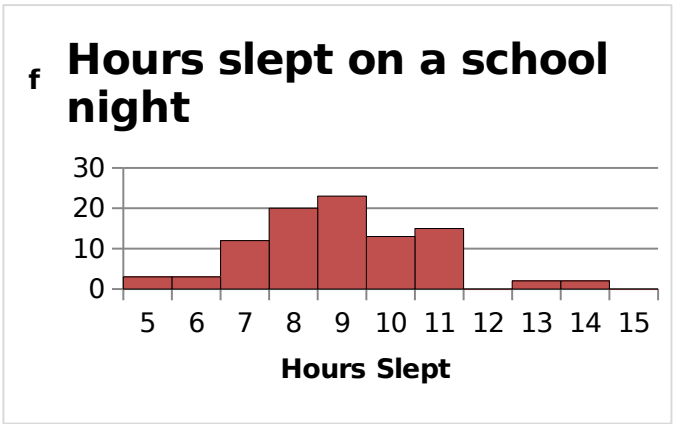
1. Follow steps for Picture Graph 1 above.
2. From the Insert tab select Shape and

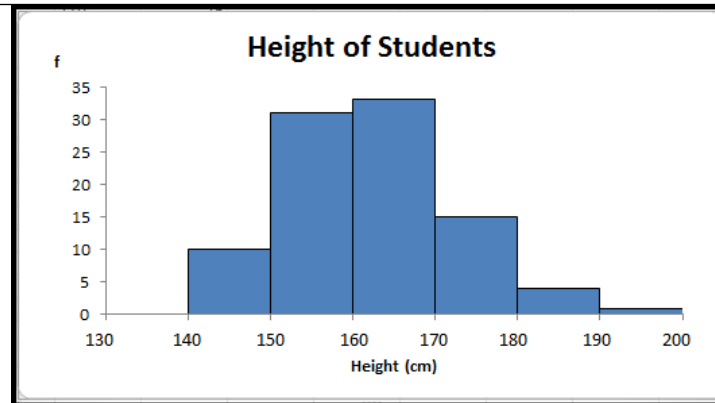
discrete numerical data. Many to one correspondence Used for categorical and discrete numerical data. NB Can use crosses etc.	shapes of boxplots to corresponding histograms and dot plots 6	Mode of Travel to School for Boys  Mode of Travel to School for Girls 	then oval to create and insert a circle in place of the picture. DOT PLOT 2 - Follow steps for Picture Graph 2 above. - From the Insert tab select Shape and then oval to create and insert a circle in place of the
Pie Graphs	Year level	Example of Chart	Excel Skills
Used for categorical and discrete numerical data	(6 Elaboration)	Eye Colour  NOTE: Yr 6 (Elaboration) "identifying potentially misleading data representations such as...pie charts in which the whole pie does not represent the entire population"	PIE GRAPH - Create a frequency table. - From the Insert tab select the first Pie. - With the graph selected, go to the design tab and select the label option you prefer. - Follow step 3 in Bar Graph 1 to change sector colours.

Stem and Leaf Plots	Year level	Example of Chart	Excel Skills																																							
Single Used for discrete and continuous numerical data.	7	Belly button Heights <table border="1"><thead><tr><th>stem</th><th>leaf</th></tr></thead><tbody><tr><td>3</td><td>4, 5, 6, 7</td></tr><tr><td>4</td><td>9</td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td></td></tr><tr><td>7</td><td></td></tr><tr><td>8</td><td>0, 1, 1, 2, 2, 5, 6, 6, 7, 7, 7, 8</td></tr><tr><td>9</td><td>0, 0, 2, 2, 2, 2, 2, 3, 4, 4, 4, 5, 6, 6, 6, 6, 7, 7, 7, 8, 8, 8, 8, 9, 9, 9, 9</td></tr><tr><td>10</td><td>0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 4, 4, 5, 5, 5, 6, 6, 7, 8</td></tr><tr><td>11</td><td>0, 0, 0, 0, 0, 0, 2, 3, 6</td></tr><tr><td>12</td><td>0</td></tr><tr><td>13</td><td>0, 1</td></tr><tr><td>14</td><td>0, 6, 8</td></tr></tbody></table> KEY 3 4 represents 34	stem	leaf	3	4, 5, 6, 7	4	9	5		6		7		8	0, 1, 1, 2, 2, 5, 6, 6, 7, 7, 7, 8	9	0, 0, 2, 2, 2, 2, 2, 3, 4, 4, 4, 5, 6, 6, 6, 6, 7, 7, 7, 8, 8, 8, 8, 9, 9, 9, 9	10	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 4, 4, 5, 5, 5, 6, 6, 7, 8	11	0, 0, 0, 0, 0, 0, 2, 3, 6	12	0	13	0, 1	14	0, 6, 8	STEM AND LEAF PLOT 1 and 3 1. Order your data as shown in Table 2 step 2. 2. Create a frequency table as in Table 1 1. Ensure that the numbers in the leaves are set out evenly, separated by a comma and a space. 3. Remember to show the key.													
stem	leaf																																									
3	4, 5, 6, 7																																									
4	9																																									
5																																										
6																																										
7																																										
8	0, 1, 1, 2, 2, 5, 6, 6, 7, 7, 7, 8																																									
9	0, 0, 2, 2, 2, 2, 2, 3, 4, 4, 4, 5, 6, 6, 6, 6, 7, 7, 7, 8, 8, 8, 8, 9, 9, 9, 9																																									
10	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 4, 4, 5, 5, 5, 6, 6, 7, 8																																									
11	0, 0, 0, 0, 0, 0, 2, 3, 6																																									
12	0																																									
13	0, 1																																									
14	0, 6, 8																																									
Back to back Used for discrete and continuous numerical data.	9 “Describe data using terms including ‘skewed’, ‘symmetric’, and ‘bi modal’”	Belly button Heights <table border="1"><thead><tr><th></th><th>Females</th><th>Males</th></tr></thead><tbody><tr><td></td><td></td><td>3 4, 5, 6, 7</td></tr><tr><td></td><td>9</td><td>4</td></tr><tr><td></td><td></td><td>5</td></tr><tr><td></td><td></td><td>6</td></tr><tr><td></td><td></td><td>7</td></tr><tr><td></td><td>8, 7, 7, 6, 5, 2, 1, 0</td><td>8 1, 2, 6, 7,</td></tr><tr><td></td><td>9 9, 9, 8, 8, 8, 7, 7, 5, 4, 4, 2, 2, 2, 0, 0</td><td>9 2, 2, 2, 3, 4, 5, 6, 6, 6, 6, 7, 8, 8, 9</td></tr><tr><td></td><td>8, 6, 4, 3, 3, 2, 2, 2, 1, 1, 1, 0, 0, 0, 0, 0, 0</td><td>10 0, 0, 0, 0, 0, 0, 1, 2, 3, 4, 5, 5, 5, 6, 7</td></tr><tr><td></td><td>0, 0, 0, 0</td><td>11 0, 0, 0, 2, 3, 6</td></tr><tr><td></td><td></td><td>12 0</td></tr><tr><td></td><td></td><td>13 0, 1</td></tr><tr><td></td><td>0</td><td>14 0, 6, 8</td></tr></tbody></table> KEY 3 4 represents 34		Females	Males			3 4, 5, 6, 7		9	4			5			6			7		8, 7, 7, 6, 5, 2, 1, 0	8 1, 2, 6, 7,		9 9, 9, 8, 8, 8, 7, 7, 5, 4, 4, 2, 2, 2, 0, 0	9 2, 2, 2, 3, 4, 5, 6, 6, 6, 6, 7, 8, 8, 9		8, 6, 4, 3, 3, 2, 2, 2, 1, 1, 1, 0, 0, 0, 0, 0, 0	10 0, 0, 0, 0, 0, 0, 1, 2, 3, 4, 5, 5, 5, 6, 7		0, 0, 0, 0	11 0, 0, 0, 2, 3, 6			12 0			13 0, 1		0	14 0, 6, 8	BACK TO BACK STEM AND LEAF PLOT 2 As above. Note: values in the left hand leaves show values ascending from right to left.
	Females	Males																																								
		3 4, 5, 6, 7																																								
	9	4																																								
		5																																								
		6																																								
		7																																								
	8, 7, 7, 6, 5, 2, 1, 0	8 1, 2, 6, 7,																																								
	9 9, 9, 8, 8, 8, 7, 7, 5, 4, 4, 2, 2, 2, 0, 0	9 2, 2, 2, 3, 4, 5, 6, 6, 6, 6, 7, 8, 8, 9																																								
	8, 6, 4, 3, 3, 2, 2, 2, 1, 1, 1, 0, 0, 0, 0, 0, 0	10 0, 0, 0, 0, 0, 0, 1, 2, 3, 4, 5, 5, 5, 6, 7																																								
	0, 0, 0, 0	11 0, 0, 0, 2, 3, 6																																								
		12 0																																								
		13 0, 1																																								
	0	14 0, 6, 8																																								
Split stems Used for discrete and continuous numerical data.	(not specified)	Dominant Hand Reaction Time																																								

stem	leaf
1	
1*	5, 6
2	1, 3,
2*	5, 5, 6, 6, 6, 6, 6, 7, 8, 8, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9
3	1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 4, 4, 4, 4, 4, 4
3*	5, 5, 5, 5, 6, 6, 6, 7, 7, 7, 7, 7, 9, 9, 9, 9, 9, 9, 9, 9
4	0, 0, 0, 2, 2, 3, 3, 4
4*	6, 6, 6
5	0, 0, 0, 2, 3, 4, 4,
5*	7,
6	0, 2,
6*	7
7	
7*	
8	
8*	
9	3

Key 3/1 represents 3.1

Histograms	Year level	Example of Chart	Excel Skills																								
Used for discrete numerical	9 Describe data using terms including 'skewed', 'symmetric', and 'bi modal' 10 Compare shapes of boxplots to corresponding histograms and dot plots	f Hours slept on a school night  <table border="1"><caption>Data for Histogram: Hours slept on a school night</caption><thead><tr><th>Hours Slept</th><th>Frequency</th></tr></thead><tbody><tr><td>5</td><td>3</td></tr><tr><td>6</td><td>3</td></tr><tr><td>7</td><td>12</td></tr><tr><td>8</td><td>20</td></tr><tr><td>9</td><td>23</td></tr><tr><td>10</td><td>13</td></tr><tr><td>11</td><td>15</td></tr><tr><td>12</td><td>0</td></tr><tr><td>13</td><td>2</td></tr><tr><td>14</td><td>2</td></tr><tr><td>15</td><td>0</td></tr></tbody></table>	Hours Slept	Frequency	5	3	6	3	7	12	8	20	9	23	10	13	11	15	12	0	13	2	14	2	15	0	HISTOGRAM 1 - Follow steps in Bar Chart 1. - Retain frequency bars only. Click on other bars and delete. - Click on Series labels and delete. - In the Layout tab choose Chart title and then Axis title to label your graph. - If necessary, Select the Design tab, Data, Select Data. Under Horizontal (Category) Axis Labels, select Edit. - From the frequency table select the range of values to be shown on the horizontal axis. Then OK. - Double click on the bars then slide the slider to No Gap. - In the Format tab choose a contrasting outline shape colour.
Hours Slept	Frequency																										
5	3																										
6	3																										
7	12																										
8	20																										
9	23																										
10	13																										
11	15																										
12	0																										
13	2																										
14	2																										
15	0																										
Grouped numerical	(not specified)																										



HISTOGRAM 2

1. Follow the steps above.
2. For grouped data, the interval labels need to be placed below the axis marks. This is most easily done by inserting a text box with the axis labels.

Box Plot

Box and whisker plot

Year level

Example of Chart

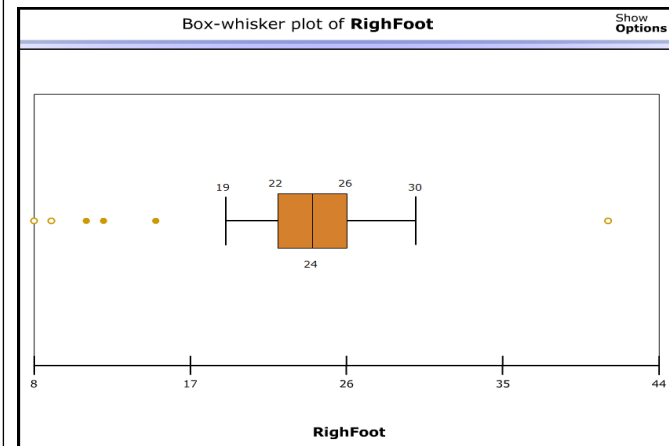
Excel Skills

Single box plot

Used for categorical and discrete numerical data.

10

Compare shapes of boxplots to corresponding histograms and dot plots



BOX AND WHISKER PLOTS 1 & 2

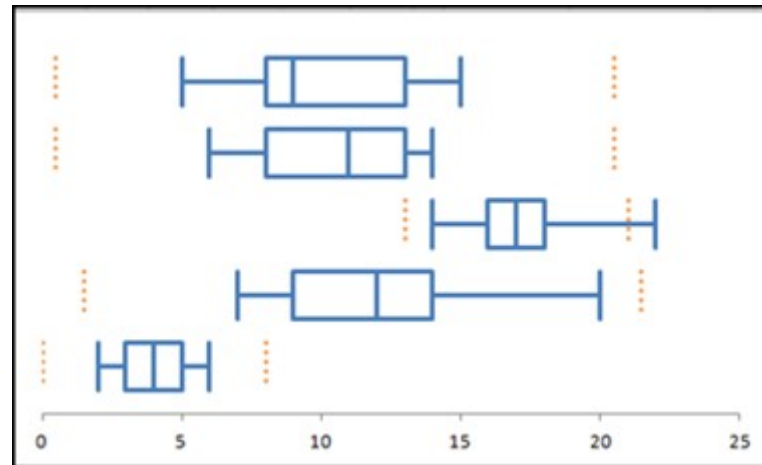
Box and whisker plots not a standard chart type in Excel. The first plot was made using the International Data Tool (UK CensusAtSchool). There is a link to this tool on the [ABS CensusAtSchool](#) pages.

However, it is possible to use 'Scatterplots with straight lines' to create box plots by joining ordered pairs of coordinates. Calculated values of min, Q₁, med, Q₃ and max are used for the x axis while the y axis values specify vertical position.

Parallel box plots

Used to compare the distribution of two numerical data sets

10



box and whisker plot 1		x	y	
Vertical bars	1	min top	min	3
		min bottom	min	1
	2	Q1 top	Q1	3
		Q1 bottom	Q1	1
	3	med top	med	3
		med bottom	med	1
Horizontal bars	4	Q3 top	Q3	3
		Q3 bottom	Q3	1
	5	max top	max	3
		max bottom	max	1
Horizontal bars	1	box top left	Q2	3
		box top right	Q3	3
	2	box bottom left	Q1	1
		box bottom right	Q3	1
Horizontal bars	3	left whisker minimum	min	2
		left whisker maximum	Q2	2
	4	right whisker minimum	Q3	2
		right whisker maximum	max	2
				end of plot 1

For parallel box and whisker plots repeat the details of any subsequent plot below the first one after leaving a one row gap. Increase the y values to allow new box plots to be drawn above the original.

The Education Services box and whisker plot tool uses this method to draw up to 5 parallel plots and identify possible outliers. Click on the link on the [Education Services home page](#)

Scatter plots

Year level

Example of Chart

Excel Skills

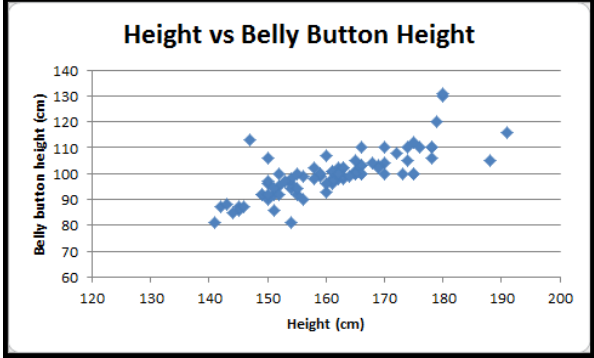
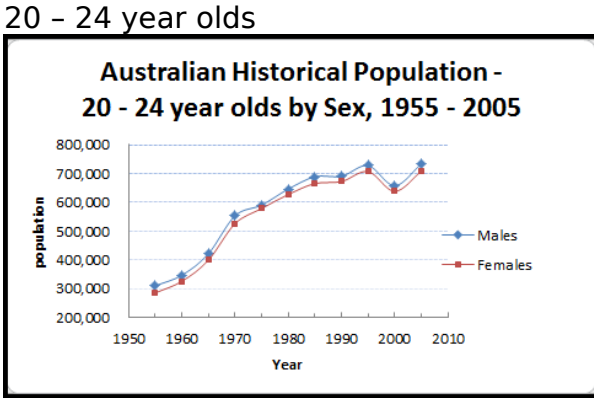
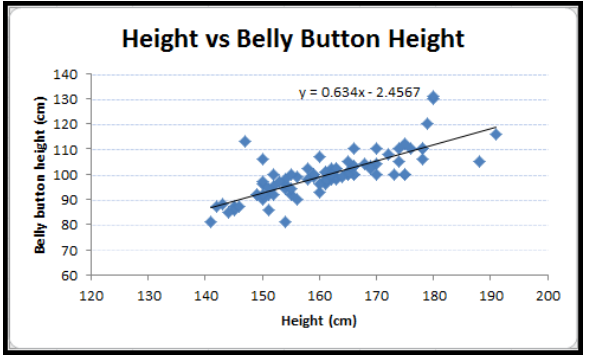
A bivariate display for numerical data

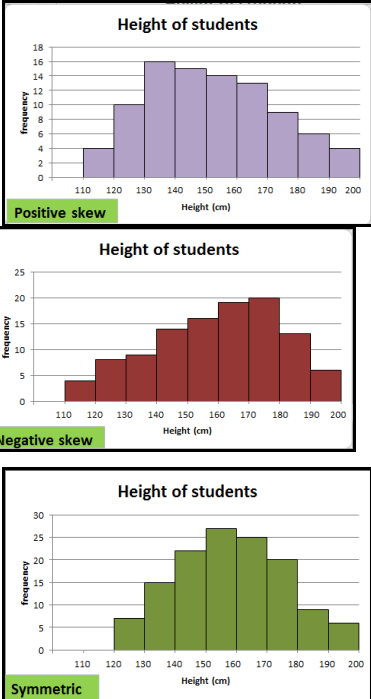
Relationship can be negative or positive, weak, strong or none, linear or non

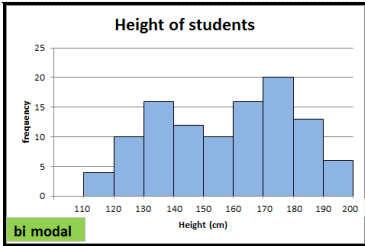
10

SCATTER PLOT 1

1. Select the 2 data sets you are looking for a relationship between.
2. In the Insert tab select the first Scatter plot.
3. To change the axis scale, from the Layout tab choose Axis then Primary Axis then

linear Independent variable is time Straight line of best fit (linear trend line)	10 10A	   $Belly\ button\ height = 0.634 \times height + 2.457\ cm$ Used for continuous and discrete numerical data	Primary Horizontal Axis then <u>More</u> Primary Horizontal Axis Options. 4. Choose appropriate Minimum, Maximum and Major unit values TIME SERIES SCATTER PLOT 2 (INDEPENDENT VARIABLE IS TIME) 1. Select all data to be graphed including headings. 2. From the Insert tab select Scatter then Scatter with Straight Line and Markers. 3. Format line by first selecting it, then going to the Format tab selecting Shape LINE OF BEST FIT SCATTER PLOT 3 1. Follow steps 1 - 4 for Scatter plot 1. 2. In the Format tab select Trend line and select appropriate line option. 3. Tick the box to display trend line on the graph. Excel Skills
Summary statistics	Year level		

Measures of Centre: median, mean, mode Measures of Spread: range	7 Includes “locating mean, median and range on graphs and connecting them to real life”)	Numerical: - Median: Centre of ordered data - Mean: sum of data divided by the number of data values Categorical: - Mode: most frequently occurring item Numerical - Range	Median In an empty cell, type =median (then select the data) Enter. e.g. =median(a2:a201) Mean In an empty cell, type =average (then select the data) Enter. Mode In an empty cell, type =mode(then select the data) Enter. Range In an empty cell, type =max(then select the data)Enter - =min(then select the data)Enter.
Outliers: effect on mean and median	8		
Description of shape: skewed, symmetric, bi modal	9 10 Compare shapes of boxplots to corresponding histograms and dot plots	 The figure contains three histograms, each titled 'Height of students'. 1. Positive skew: The x-axis is 'Height (cm)' from 110 to 200, and the y-axis is 'frequency' from 0 to 18. The distribution is skewed to the right, with a peak around 140-150 cm. 2. Negative skew: The x-axis is 'Height (cm)' from 110 to 200, and the y-axis is 'frequency' from 0 to 25. The distribution is skewed to the left, with a peak around 170-180 cm. 3. Symmetric: The x-axis is 'Height (cm)' from 110 to 200, and the y-axis is 'frequency' from 0 to 30. The distribution is symmetric and bell-shaped, centered around 150-160 cm.	

			
• Measures of Spread: range, interquartile range, 5 number summary	10	Numerical • Range max – min • Interquartile range (IQR) $Q_3 - Q_1$ • min, Q_1, median, Q_3, max	
• Measures of Spread: mean and standard deviation	10A interpret mean and standard deviation	For a normal distribution 68% of observed values fall within 1 standard deviation of the mean, 95% of observed values fall within 2 standard deviations of mean, 69.7% of observed values fall within 3 standard deviations of mean	

Some general notes on making charts

Charts convey quick visual information about a distribution. This is more obvious when diagrams use a scale so comparative integrity can be assumed. Charts in 2D are more accurately read than those in 3D. Graphs should:

- always show chart title, axes labels and provide a key when necessary
- use a scale whenever possible
- be shown in 2D rather than 3D

Also:

- (Year 6 Elaboration) Beware of graphs that are “...potentially misleading ...such as...with ‘broken’ axes, non-linear scales...”
- From Year 3 “Create displays....with and without the use of digital technologies”

Glossary

Note: (A) indicates definition from the ACARA Glossary

Bar graph	A bar graph is used to show discrete data. It shows separate bars to represent the frequency of each category of data. The bars can be vertical or horizontal. (A)
Categorical data	A categorical variable has two or more categories without any ordering. e.g. hair colour is a categorical variable because there is no ordered way of describing hair colour. A purely categorical variable is one that simply allows you to assign categories but you cannot clearly order the variables. (A) Note: where numbers represents a category e.g. Postcodes represent areas, they are classed as categorical data.

Column graph	Column graphs are used to show categories of data that has been counted. These categories consist of separate or discrete data. The horizontal axis is marked in equal intervals and the vertical columns are also of equal interval size. They are used for comparing things. In a column graph, the height of the column shows the number of individuals. Since the data is not related, the columns stand alone. (A)
Continuous data	Continuous data is data which can take any numerical value within certain restrictions. It is data which is not discrete. (e.g. height, time)
Data	Information collected for analysis or reference. (A)
Data display	A visual format for organising information (e.g. graphs, charts)
Dependent variable	A dependent variable is one whose value depends on the value of another variable. (A) e.g. height depends on age
Discrete data	Separate data(A) Data that can only take particular values (e.g. shoe size, number of eggs)
Distribution	The pattern of variation of a variable
Dot plot	A dot plot is a chart where each data point is represented as a dot. (A)
Independent variable	An independent variable is one whose value does not depend on the value of another variable e.g. height depends on time
Mean	The mean of a set of numbers can be calculated by summing all the values and dividing by the number of values. (A)
Median	The median of a set of values is the middle value when all values are arranged in numerical order. E.g. for the set {13, 23, 11, 16, 15, 10, 26} written in order {10, 11, 13, 15, 16, 23, 26} the median is 15. If there is an even number of data values the median is the average of the two middle values. (A)
Mode	The mode value of a data set is the most commonly occurring value. (A)
Numerical data	Can be discrete, data can take specified values only; or continuous, data can take any value within a range. Also see note above in 'Categorical data'
Picture graph	A graph that use pictures to represent the frequency of the data in each category. Each symbol can represent one piece of data or more than one piece of data. (A)
Stem and leaf plots	Stem and leaf plots are a table where discrete data is represented (usually in order) by distinguishing values (the leaf) within set intervals (the stem) (e.g. the set of students' height in cms.....XXX.... Key: 15 2 = 152 cms Stem plots provide a visual indication of spread. (A)
Univariate data	Data that has only one variable is called univariate data. (A)
Variable	Any characteristic of a person or thing